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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

EOM, ROBERT J

ART UNIT

PAPER NUMBER

1797

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/535,567	Applicant(s) DAVIES ET AL.	
	Examiner ROBERT EOM	Art Unit 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 11 February 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-22,27,33 and 34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-22,27,33 and 34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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4. Claims **2, 4, 5, 7, 8, 14, 15, 18-22, and 27** are rejected under 35 U.S.C. 103(a) as being unpatentable over Tantrum (USP 5,070,721), in view of Tindall et al. (USP 6,351,982 B1).

Regarding claim 2, Tantrum discloses a flammable gas detection (**Fig. 1**) apparatus comprising a gas sensitive element (**see: catalytic element 5**) contained within a flameproof housing (**see: chamber 3**) supporting a flame arrestor which enables gas flow into the housing (**see: diffusion barrier 4**), and the gas sensitive element being connected to conducting leads (**see: leads 6**) which are accessible through, and are at least partially encapsulated by, the wall of the housing so that there is intimate contact between the wall and the conducting leads, the encapsulation wall having sufficient thickness such that the housing will not allow the propagation of an ignition source from within the device to the ambient atmosphere (**C3/L8-12**).

While Tantrum does not explicitly disclose the housing being a plastics housing, Tindall teaches a flammable gas detector with a plastic housing body (**Fig. 1, see: housing 10**).

It would have been obvious to one having ordinary skill in the art at the time of the invention to utilize a flame retardant plastic (**Tindall: C2/L27-35**) as the material for the housing of Tantrum's flammable gas sensor since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice (**Tantrum: C3/L8-12**). See: In re Leshin, 125 USPQ 416.

Regarding claim 4, modified Tantrum discloses all of the claim limitations as set forth above. Tantrum further discloses the flame arrestor is located above the gas sensitive element (**Fig. 1, see: diffusion barrier 4; C2/L50-52**), the conducting leads being accessible through a side walk of the housing (**see: leads 6 in relation to chamber 3**).

Regarding claim 5, modified Tantrum discloses all of the claim limitations as set forth above. Tindall further discloses the conducting leads are coupled with respective contacts located in an integral extension of the housing (**C3/L34-36, see: sleeve portion 24**).

Regarding claim 7, modified Tantrum discloses all of the claim limitations as set forth above. Tantrum further discloses the flame arrestor is a metal mesh (**Fig. 1, see: diffusion barrier 4; C2/L50-52**).

Regarding claim 8, modified Tantrum discloses all of the claim limitations as set forth above. Tindall further discloses the flame arrestor is joined to the plastics housing by a process of thermal bonding around its perimeter (**C4/L54-58, see: injection molding process**).

Regarding claim 14, modified Tantrum discloses all of the claim limitations as set forth above. Tindall further discloses means for protecting one or more of the gas sensitive element from shock damage (**Fig. 2, see: supporting block 22**).

Regarding claim 15, modified Tantrum discloses all of the claim limitations as set forth above. Tindall et al. further discloses means for insulating the gas sensitive

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element and electrical connections, either in terms of electrical insulation or heat insulation, or both (**Fig. 2, see: epoxy resin encapsulant 25**).

Regarding claim 18, modified Tantrum discloses all of the claim limitations as set forth above. Tindall et al. further discloses a compensating element (**Fig. 2, see: reference element 19**).

Regarding claim 19, modified Tantrum discloses all of the claim limitations as set forth above. Tindall et al. further discloses the compensating element comprises a catalytic bead (**C3/L52**).

Regarding claim 20, modified Tantrum discloses all of the claim limitations as set forth above. Tindall et al. further discloses the gas sensitive element positioned at least partly within a respective recess in an interior wall of the housing (**Fig. 2, see: shoulder 28**).

Regarding claim 21, modified Tantrum discloses all of the claim limitations as set forth above. Tindall et al. further discloses the recess also contains means for the protection and insulation of the gas sensitive element positioned at least partly inside it (**Fig. 2, see: sensor retainer 16**).

Regarding claim 22, modified Tantrum discloses all of the claim limitations as set forth above, but the reference does not explicitly disclose the thickness of the portion of the housing wall through which the conducting leads extend is substantially at least 6 mm. As the cost of manufacture and the ability of the sensor to withstand flames are variables that can be modified, by adjusting said thickness of the housing wall, with said manufacturing cost and flame durability increasing as the housing wall thickness is

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increased, the precise housing wall thickness cannot be considered critical.

Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the thickness housing wall of modified Tantrum to obtain the desired balance between the manufacturing cost and the flame durability (*In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (*In re Aller*, 105 USPQ 223).

Regarding claim 27, modified Tantrum discloses all of the claim limitations as set forth above. Tindall et al. further discloses the plastics housing comprises at least an inner portion (**Fig. 2, see: support ring 15**) and an outer portion (**Fig. 2, see: plastic first part 11**), the outer portion being moulded around the inner portion (**C4/L11-13, see: molded interface 26**).

5. Claims 3 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tantram (USP 5,070,721), in view of Tindall et al. (USP 6,351,982 B1), as applied to claim 2 above, in further view of Daeche et al. (WO 00/00820 see: English language translation).

Regarding claims 3 and 6, modified Tantram discloses all of the limitations as set forth above.

While modified Tantram does not explicitly disclose the plastics housing is fabricated by moulding in situ the plastics material directly around the conducting leads,

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and the conducting leads being provided by a conducting lead frame fabricated prior to encapsulation by the plastics housing. Daeche teaches a combustible gas sensor (**P3, see: paragraph 4**) with a lead frame (**Fig. 3, see: lead frame 1**) which provides the external electrical connections for the gas sensor (**Fig. 1, see: external connections 2**). The housing is manufactured by molding plastic directly onto the lead frame (**P5, see: plastic spraying process**).

It would have been to one having ordinary skill in the art at the time of the invention to use the lead frame-direct molding manufacturing process in the gas sensor of Tindall et al., as taught by Daeche et al., since doing so allows a cost advantageous mounting and large-scale manufacture of combustible gas sensors (**Daeche: P4, see: paragraph 3**).

6. Claims 9-13 and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tantram (USP 5,070,721), in view of Tindall et al. (USP 6,351,982 B1), as applied to claims 2 and 14 above, in view of Doncaster et al. (EP 0940680 A2).

Regarding claims 9, 12-13 and 16-17, modified Tantram discloses all of the limitations as set forth above.

While modified Tantram does not explicitly disclose at least one filter, located inboard of the flame arrestor, in order to remove contaminants from the gas flow into the device such as hydrogen sulphide, and the protecting means comprising at least one layer of shock absorbent and insulating material which is made of glass wool.

Doncaster et al. teaches a combustible gas detector (**[0001]**) with a layer of glass

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microfibre insulating material protecting the catalytic bead sensing element (**Fig. 2, see: insulating material 9**) which reacts with hydrogen sulphide to prevent some of it from reaching the sensing bead (**Doncaster: [0020]**)..

It would have been obvious to one having ordinary skill in the art at the time of the invention to use a bronze sinter and a layer of glass microfibre insulating material in the gas sensor of modified Tantrum, as taught by Doncaster et al., since doing so prevents catalyst inhibition, which is caused by hydrogen sulphide (**Doncaster: [0004]**) as well as allows the gas sensor to be operable at a relatively high temperature (**Doncaster: [0020]**).

Regarding claims 10 and 11, modified Tantrum discloses all of the claim limitations as set forth above. Tindall further discloses comprises means for retaining components located outboard of the flame arrestor, the retaining means being provided by a bezel which fastens mechanically to the housing (**Fig. 4, see: plastic first part 11**).

7. Claims 33 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Daeche et al. (WO 00/00820 see: English language translation), in view of Tindall et al. (USP 6,351,982 B1).

Regarding claims 33 and 34, Daeche et al. discloses a method of manufacturing a device for sensing a gas, the method comprising moulding a plastics housing in situ directly around a set of conducting leads so that there is intimate contact between the wall and the conducting leads (**P5, see: plastic spraying process**), mounting at least

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one gas sensitive element inside the housing and connecting it or them to the conducting leads (**Fig. 3, see sensor element 3**) which are accessible through, and at least partially encapsulated by, the wall of the housing (**Fig. 1, see: external connections 2**), the encapsulating wall having sufficient thickness that the housing will not allow the propagation of an ignition source from within the device to the ambient atmosphere, under working conditions (**P3, see: paragraph 4**).

While Daeche does not explicitly disclose securing a flame arrestor to the housing which completes the flameproof enclosure yet enables gas to flow into the interior, the flame arrestor being joined to the plastics housing by a process of thermal bonding around its perimeter. Tindall teaches a flammable gas detector (Abstract) comprising a plastic housing with a flame arrestor (**Fig. 2, see: sinter element 14**) which is joined to the plastic housing through thermal bonding (**C4/L54-58, see: injection molding process**).

It would have been obvious to one having ordinary skill in the art at the time of the invention to incorporate a flame arrestor in the combustible gas sensor of Daeche, as taught by Tindall, since the flame arrestor enables gas flow through the gas sensor but prevents the propagation of a flame front outside the housing (**Tindall: C1/L44-58**).

Response to Arguments

8. Applicant's arguments with respect to claims 2-22, 27, and 33-34 have been considered but are moot in view of the new ground(s) of rejection.

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The applicant has amended language to the structural relationship between the leads to the wall of the housing (within the independent claims 2 and 33) for consideration upon merits for patentability.

Additionally, applicant's arguments filed 02/11/2009, with regards to claim 33 have been fully considered but they are not persuasive.

- The applicant asserts that Daeche is silent on the flameproof qualities of the sensor and lacks the thickness and structural traits to prevent the propagation of an ignition source from within the device to the outside atmosphere (**Applicant's Response, see: P12-13**). However Daeche explicitly discloses the necessity for the "protective sheath" of the sensor element to prevent the escape of explosive flames (**see: P3/Paragraph 4**).
- The applicant asserts that the mounting of the sensor element to the lead fram prior to the moulding process is unworkable because the excessive temperatures would destroy the functionality of the sensing element. However, as noted above, Daeche discloses the robustness of the gas sensor, with the ability to detect gases "which are ignited within the protective sheath by the sensor element that has been heated to several hundred degrees Celsius, i.e., possibly above the flash point of the gases to be detected" (**see: P3/Paragraph 4**).
- The applicant asserts that the Office Action suggests that a person of ordinary skill in the art would start with the teaching of Tindall, and replace the disclosed "can" housing construction of Tindall with the direct moulding process discloses

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by Daeche. However the Office Action clearly starts with the direct moulding process of Daeche and adds the flame arrestor of Tindall to the housing for enhanced flameproofing of the gas sensor of Daeche.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT EOM whose telephone number is (571)270-7075. The examiner can normally be reached on Mon.-Thur., 9:00am-5:00pm, EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571)272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Tony G Soohoo/
Primary Examiner, Art Unit 1797

/R. E./
Examiner, Art Unit 1797